



## Complete Summary

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### TITLE

Perforated appendix: hospital admission rate.

### SOURCE(S)

AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 59 p.(AHRQ Pub; no. 02-R0203).

AHRQ quality indicators. Prevention quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. 22 p.

## Measure Domain

### PRIMARY MEASURE DOMAIN

Population Health

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the [Measure Validity](#) page.

### SECONDARY MEASURE DOMAIN

Access

## Brief Abstract

### DESCRIPTION

This measure is used to assess the number of admissions for perforated appendix per 100 admissions for appendicitis within Metro Area or county.

As a Prevention Quality Indicator (PQI), admission for perforated appendix is not a measure of hospital quality, but rather one measure of outpatient and other health care.

### RATIONALE

Prevention is an important role for all health care providers. Providers can help individuals stay healthy by preventing disease, and they can prevent complications of existing disease by helping patients live with their illnesses. To fulfill this role, however, providers need data on the impact of their services and the opportunity to compare these data over time or across communities. Local, State, and Federal policymakers also need these tools and data to identify potential access or quality-of-care problems related to prevention, to plan specific interventions, and to evaluate how well these interventions meet the goals of preventing illness and disability.

While these indicators use hospital inpatient data, their focus is an outpatient health care. Except in the case of patients who are readmitted soon after discharge from a hospital, the quality of inpatient care is unlikely to be a significant determinant of admission rates for ambulatory care sensitive conditions. Rather, the Prevention Quality Indicators (PQIs) assess the quality of the health care system as a whole, and especially the quality of ambulatory care, in preventing medical complications. As a result, these measures are likely to be of the greatest value when calculated at the population level and when used by public health groups, State data organizations, and other organizations concerned with the health of populations.

These indicators\* serve as a screening tool rather than as definitive measures of quality problems. They can provide initial information about potential problems in the community that may require further, more in-depth analysis.

Perforated appendix may occur when appropriate treatment for acute appendicitis is delayed for a number of reasons, including problems with access to care, failure by the patient to interpret symptoms as important, and misdiagnosis and other delays in obtaining surgery.

Timely diagnosis and treatment may reduce the incidence of perforated appendix.

\*The following caveats were identified from the literature review for the "Perforated Appendix Admission Rate" indicator:

- *Proxy*<sup>a</sup>: Indicator does not directly measure patient outcomes but an aspect of care that is associated with the outcome; thus, it is best used with other indicators that measure similar aspects of care.

Refer to the original measure documentation for further details.

**Note:**

**a** - The concern is theoretical or suggested, but no specific evidence was found in the literature.

## **PRIMARY CLINICAL COMPONENT**

Perforated appendix; hospital admission rates

## **DENOMINATOR DESCRIPTION**

All non-maternal discharges, age 18 years and older, within Metro Area or county with diagnosis code\* for appendicitis in any field

\*Refer to the Technical Specifications document for specific International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.

## **NUMERATOR DESCRIPTION**

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code\* for perforation or abscess of appendix in any field among cases meeting the inclusion criteria for the denominator

Exclude cases:

- Transferring from another institution
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)
- MDC 15 (newborn and other neonates)

\*Refer to the Technical Specifications document for specific ICD-9-CM codes.

## **Evidence Supporting the Measure**

### **EVIDENCE SUPPORTING THE VALUE OF MONITORING THE ASPECT OF POPULATION HEALTH**

- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

## **Evidence Supporting Need for the Measure**

### **NEED FOR THE MEASURE**

Monitoring health state(s)  
Variation in health state(s)

### **EVIDENCE SUPPORTING NEED FOR THE MEASURE**

AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 59 p.(AHRQ Pub; no. 02-R0203).

## **State of Use of the Measure**

### **STATE OF USE**

Current routine use

### **CURRENT USE**

Monitoring health state(s)  
National reporting

### Application of Measure in its Current Use

#### **CARE SETTING**

Ambulatory Care  
Community Health Care

#### **PROFESSIONALS RESPONSIBLE FOR HEALTH CARE**

Physicians  
Public Health Professionals

#### **LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED**

Counties or Cities

#### **TARGET POPULATION AGE**

Age greater than or equal to 18 years

#### **TARGET POPULATION GENDER**

Either male or female

#### **STRATIFICATION BY VULNERABLE POPULATIONS**

Unspecified

### Characteristics of the Primary Clinical Component

#### **INCIDENCE/PREVALENCE**

Perforated appendix occurs in one-fourth to one-third of hospitalized acute appendicitis patients.

#### **EVIDENCE FOR INCIDENCE/PREVALENCE**

Braveman P, Schaaf VM, Egerter S, Bennett T, Schecter W. Insurance-related differences in the risk of ruptured appendix. N Engl J Med 1994 Aug 18;331(7):444-9. [PubMed](#)

#### **ASSOCIATION WITH VULNERABLE POPULATIONS**

- Higher rates of perforated appendix have been noted in males, patients with mental illness or substance abuse disorders, people with diabetes, and blacks,

- as well as in children under the age of 4 (although appendicitis is rare in this age group).
- Braveman et al. found that the rate of perforated appendix was 50% higher for patients with no insurance or Medicaid than HMO-covered patients, and 20% higher for patients with private fee-for-service insurance. A follow-up study by Blumberg et al. concluded that the high rate of perforated appendix in the black population at an HMO may be explained by delay in seeking care, rather than differences in the quality of health care.
  - Weissman et al. found that uninsured (but not Medicaid) patients are at increased risk for ruptured appendix after adjusting for age and sex.

## **EVIDENCE FOR ASSOCIATION WITH VULNERABLE POPULATIONS**

Blumberg MS, Juhn PI. Insurance and the risk of ruptured appendix. N Engl J Med1995 Feb 9;332(6):395-6; discussion 397-8. [PubMed](#)

Bratton SL, Haberkern CM, Waldhausen JH. Acute appendicitis risks of complications: age and Medicaid insurance. Pediatrics2000 Jul;106(1 Pt 1):75-8. [PubMed](#)

Braveman P, Schaaf VM, Egerter S, Bennett T, Schechter W. Insurance-related differences in the risk of ruptured appendix. N Engl J Med1994 Aug 18;331(7):444-9. [PubMed](#)

Weissman JS, Gatsonis C, Epstein AM. Rates of avoidable hospitalization by insurance status in Massachusetts and Maryland. JAMA1992 Nov 4;268(17):2388-94. [PubMed](#)

## **BURDEN OF ILLNESS**

Unspecified

## **UTILIZATION**

Unspecified

## **COSTS**

Unspecified

## **Institute of Medicine National Healthcare Quality Report Categories**

## **IOM CARE NEED**

Getting Better

## **IOM DOMAIN**

Effectiveness  
Timeliness

## **CASE FINDING**

Users of care only

## **DESCRIPTION OF CASE FINDING**

All non-maternal discharges, age 18 years and older, within Metro Area or county with diagnosis code\* for appendicitis in any field

\*Refer to the Technical Specifications document for specific International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.

## **DENOMINATOR SAMPLING FRAME**

Geographically defined

## **DENOMINATOR INCLUSIONS/EXCLUSIONS**

### **Inclusions**

All non-maternal discharges, age 18 years and older, within Metro Area or county with diagnosis code\* for appendicitis in any field

\*Refer to the Technical Specifications document for specific International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.

### **Exclusions**

Unspecified

## **RELATIONSHIP OF DENOMINATOR TO NUMERATOR**

All cases in the denominator are equally eligible to appear in the numerator

## **DENOMINATOR (INDEX) EVENT**

Clinical Condition  
Institutionalization  
Patient Characteristic

## **DENOMINATOR TIME WINDOW**

Time window is a single point in time

## **NUMERATOR INCLUSIONS/EXCLUSIONS**

### **Inclusions**

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code\* for perforation or abscess of appendix in any field among cases meeting the inclusion criteria for the denominator

\*Refer to the Technical Specifications document for specific ICD-9-CM codes.

**Exclusions**

Exclude cases:

- Transferring from another institution
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)
- MDC 15 (newborn and other neonates)

**MEASURE RESULTS UNDER CONTROL OF HEALTH CARE PROFESSIONALS, ORGANIZATIONS AND/OR POLICYMAKERS**

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

**NUMERATOR TIME WINDOW**

Institutionalization

**DATA SOURCE**

Administrative data

**LEVEL OF DETERMINATION OF QUALITY**

Does not apply to this measure

**TYPE OF HEALTH STATE**

Adverse Health State

**PRE-EXISTING INSTRUMENT USED**

Unspecified

**Computation of the Measure****SCORING**

Rate

**INTERPRETATION OF SCORE**

A lower score is desirable

**ALLOWANCE FOR PATIENT FACTORS**

Analysis by subgroup (stratification on patient factors, geographic factors, etc.)  
Risk adjustment method widely or commercially available

## **DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS**

Observed (raw) rates may be stratified by areas (Metro Areas or counties), age groups, race/ethnicity categories, and sex.

Risk adjustment of the data is recommended using age and sex.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

## **STANDARD OF COMPARISON**

External comparison at a point in time  
External comparison of time trends  
Internal time comparison

## **Evaluation of Measure Properties**

### **EXTENT OF MEASURE TESTING**

Each potential quality indicator was evaluated against the following six criteria, which were considered essential for determining the reliability and validity of a quality indicator: face validity, precision, minimum bias, construct validity, fosters real quality improvement, and application. The project team searched Medline for articles relating to each of these six areas of evaluation. Additionally, extensive empirical testing of all potential indicators was conducted using the 1995-97 Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) and Nationwide Inpatient Sample (NIS) to determine precision, bias, and construct validity. Table 1 in the original measure documentation summarizes the results of the literature review and empirical evaluations on the Prevention Quality Indicators (PQI). Refer to the original measure documentation for details.

### **EVIDENCE FOR RELIABILITY/VALIDITY TESTING**

AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 59 p.(AHRQ Pub; no. 02-R0203).

## **Identifying Information**

### **ORIGINAL TITLE**

Perforated appendix admission rate (PQI 2).

### **MEASURE COLLECTION**



**MEASURE SET NAME**

[Agency for Healthcare Research and Quality \(AHRQ\) Prevention Quality Indicators](#)

**DEVELOPER**

Agency for Healthcare Research and Quality

**FUNDING SOURCE(S)**

Agency for Healthcare Research and Quality (AHRQ)

**COMPOSITION OF THE GROUP THAT DEVELOPED THE MEASURE**

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicators are in the public domain and the specifications come from multiple sources, including the published and unpublished literature, users, researchers, and other organizations. AHRQ as an agency is responsible for the content of the indicators.

**FINANCIAL DISCLOSURES/OTHER POTENTIAL CONFLICTS OF INTEREST**

None

**ENDORSER**

National Quality Forum

**INCLUDED IN**

National Healthcare Disparities Report (NHDR)

**ADAPTATION**

This indicator was included in the original Healthcare Cost and Utilization Project Quality Indicator Set (HCUP QI).

**PARENT MEASURE**

Perforated appendix (Agency for Healthcare Research and Quality)

**RELEASE DATE**

2001 Oct

**REVISION DATE**

2008 Feb

## MEASURE STATUS

This is the current release of the measure.

This measure updates previous versions:

- AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.0a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Feb 20. 58 p. (AHRQ Pub; no. 02-R0203).
- AHRQ quality indicators. Prevention quality indicators: technical specifications [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 22 p.

## SOURCE(S)

AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 59 p.(AHRQ Pub; no. 02-R0203).

AHRQ quality indicators. Prevention quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. 22 p.

## MEASURE AVAILABILITY

The individual measure, "Perforated Appendix Admission Rate (PQI 2)," is published in "AHRQ Quality Indicators. Guide to Prevention Quality Indicators" and "AHRQ Quality Indicators. Prevention Quality Indicators: Technical Specifications." These documents are available in Portable Document Format (PDF) from the [Prevention Quality Indicators Download](#) page at the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Web site.

For more information, please contact the QI Support Team at [support@qualityindicators.ahrq.gov](mailto:support@qualityindicators.ahrq.gov).

## COMPANION DOCUMENTS

The following are available:

- AHRQ quality indicators. Prevention quality indicators: software documentation [version 3.2] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 32 p. This document is available in Portable Document Format (PDF) from the [AHRQ Quality Indicators Web site](#).
- AHRQ quality indicators. Software documentation: Windows [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 99 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).

- Prevention quality indicators (PQI): covariates [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 17 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Prevention quality indicators (PQI): covariates (age only) [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 17 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Remus D, Fraser I. Guidance for using the AHRQ quality indicators for hospital-level public reporting or payment. Rockville (MD): Agency for Healthcare Research and Quality; 2004 Aug. 24 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- UCSF-Stanford Evidence-based Practice Center. Davies GM, Geppert J, McClellan M, et al. Refinement of the HCUP quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2001 May. (Technical review; no. 4). This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- HCUPnet. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [accessed 2007 May 21]. [Various pagings]. HCUPnet is available from the [AHRQ Web site](#). See the related [QualityTools](#) summary.

## **NQMC STATUS**

This NQMC summary was completed by ECRI on December 19, 2002. The information was verified by the Agency for Healthcare Research and Quality on January 9, 2003. This NQMC summary was updated by ECRI Institute on April 6, 2004, February 18, 2005, February 27, 2006, June 15, 2007 and again on November 26, 2008.

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